

Critical thinking. Global perspective. Informed action.

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# Make A Sound Impact: Engaging Students with Puget Sound Using 21<sup>st</sup> Century Skills

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**[www.facingthefuture.org](http://www.facingthefuture.org)**

In 50 years, I think  
Puget Sound will be:

1.

2.

3.

In 50 years, I want  
Puget Sound to be:

1.

2.

3.

# About *Facing the Future*



- ⌘ Seattle-based nonprofit founded in 1995
- ⌘ Interdisciplinary global issues and sustainability curriculum for K-12
- ⌘ Over 1.5 million students reached annually
- ⌘ All 50 U.S. states and over 120 countries
- ⌘ Professional development and consulting



[www.facingthefuture.org](http://www.facingthefuture.org)



# Defining Sustainability

“Meeting our own needs without limiting the ability of future generations to meet their needs”

*World Commission on Environment & Development, 1987*



# Project Description

## Make a Sound Impact

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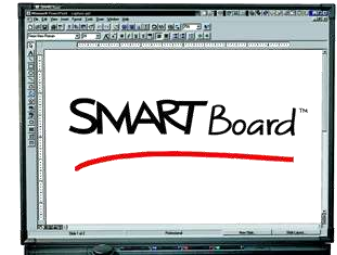


- ⌘ 4 water quality lesson units for MS and HS
- ⌘ Correlated to WA's ESE standards and GLE's for science, social studies, and technology
- ⌘ Lessons available June 2011
- ⌘ Culminating video project and contest

# Technology Components Make a Sound Impact

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⌘ Smartboard compatible



⌘ Interactive online maps



⌘ Analyzing graphs



⌘ Digital video



# Video Contest

## Make a Sound Impact

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- ⌘ Contest open June thru November 2011
- ⌘ Student created PSA's
- ⌘ Open to formal and non-formal educators
- ⌘ Prizes: cash and Flip video cameras awarded to top 3 submissions
- ⌘ Educators with 10+ student submissions receive classroom set of FTF resources



# 4 Lesson Unit

## Make a Sound Impact

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1. A Sound Introduction
2. Nonpoint Source Pollution in Puget Sound
3. Town Hall Meeting
4. Video Production

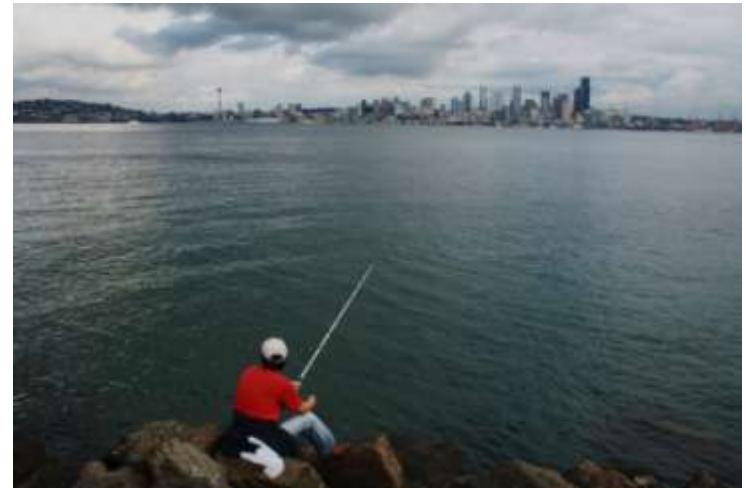


Photo by Paul Esmond

# Lesson 1

## A Sound Introduction

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- ⌘ What do the pictures have in common?
- ⌘ Think, pair, share with a partner





































# Lesson 1

## A Sound Introduction

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- ⌘ What do the pictures have in common?
- ⌘ Think, pair, share with a partner

# Lesson 1

## A Sound Introduction

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### Picture Discussion Questions

- ⌘ What surprised you?
- ⌘ Which images did you find most interesting? Why?
- ⌘ When you hear the term “Puget Sound”, what images and words come to mind?
- ⌘ What other images would you add?



# Lesson 1

## A Sound Introduction

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### Objectives

⌘ Students will:

- ☑ Recognize a variety of Puget Sound ecosystems
- ☑ Identify their location within the Puget Sound region, using an online mapping tool
- ☑ Determine how ecosystem services provided by Puget Sound support the region's sustainability



# **Ecosystem Services**

**Serving Seattle Since 1896**

**[www.ecoservseattle.com](http://www.ecoservseattle.com)**

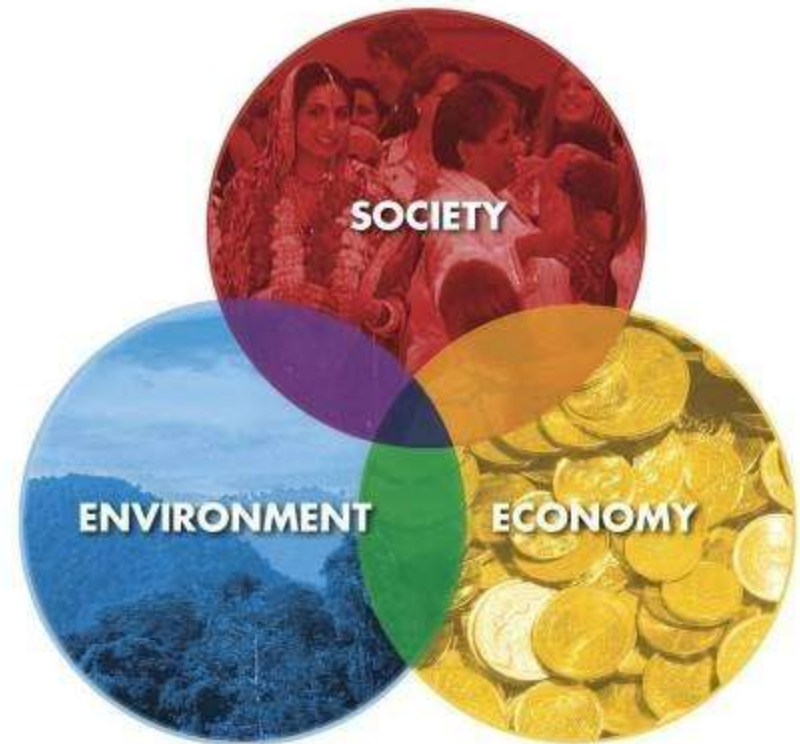


# Lesson 1

## A Sound Introduction

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- ⌘ What are *ecosystem services*?
- ⌘ Create a list of services provided by land and water resources in the Puget Sound region.
- ⌘ How are they linked to the region's sustainability?
- ⌘ Where does each service fall on the Venn diagram?





# Lesson 2

## Nonpoint Source Pollution

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# Lesson 2

## Nonpoint Source Pollution

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### Objectives

⌘ Students will:

- ☑ Differentiate between point and nonpoint source pollution
- ☑ Understand how nonpoint source pollution reaches Puget Sound through stormwater runoff
- ☑ Formulate research questions to investigate the issue of low dissolved oxygen in South Puget Sound



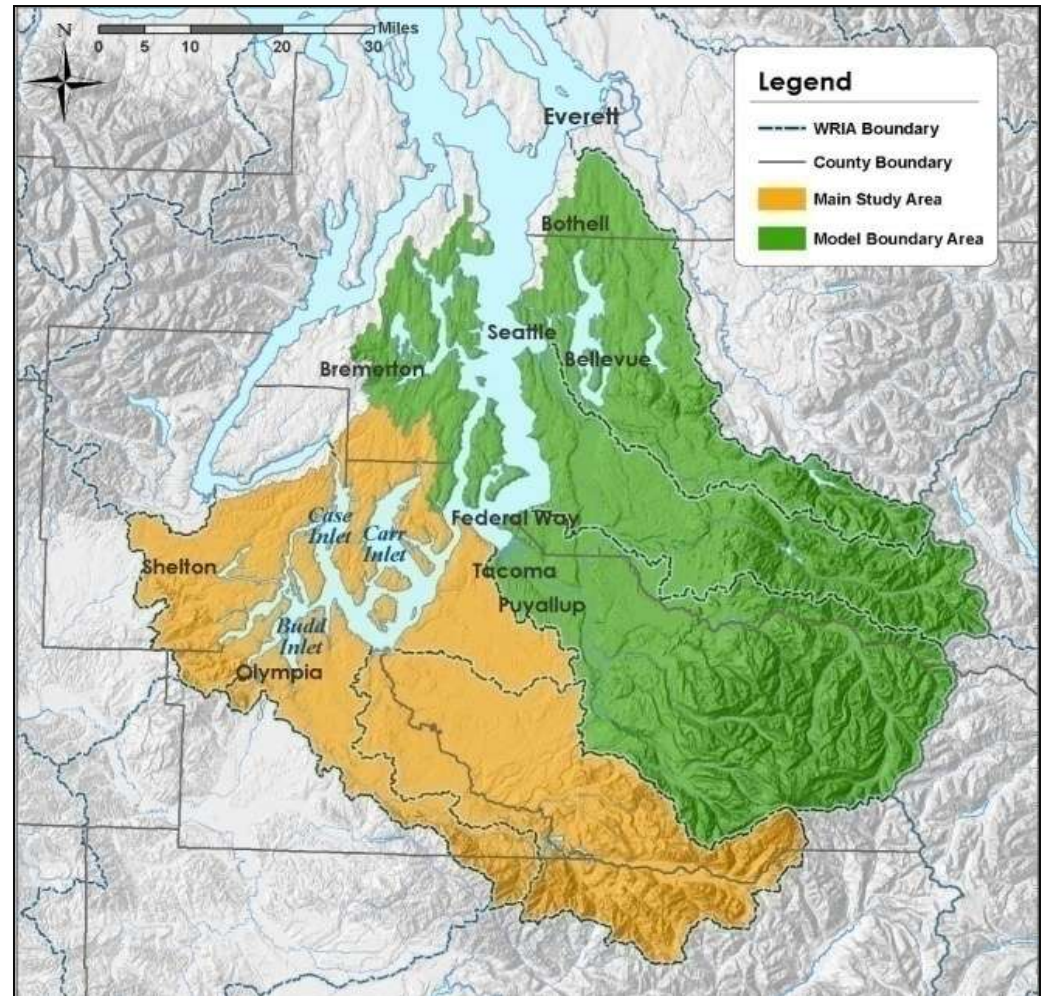
# Lesson 2

## Nonpoint Source Pollution



### South Sound Dissolved Oxygen Study

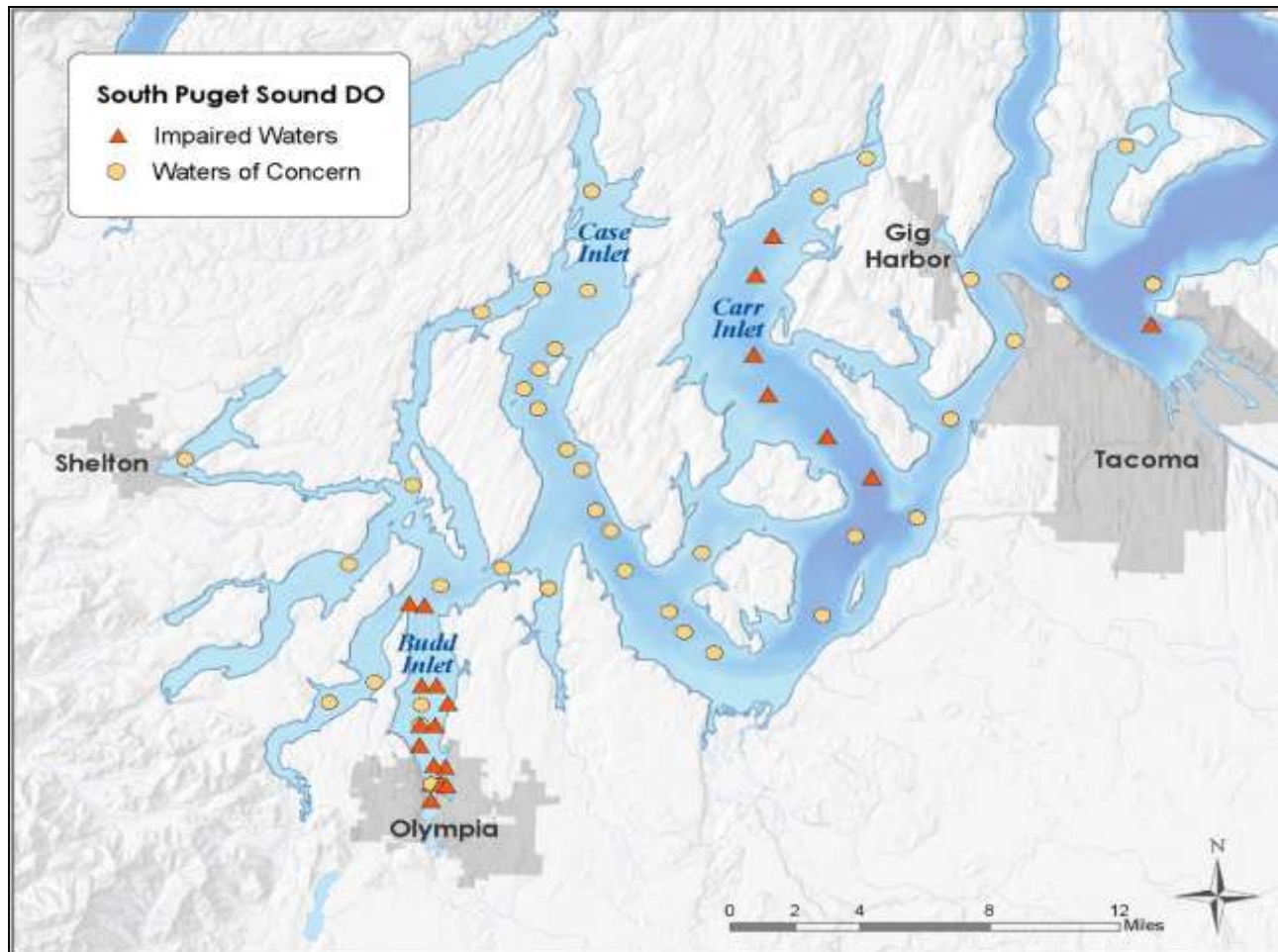
Published by  
Washington State Department  
of Ecology, 12/08



Study Area

# Lesson 2

## Nonpoint Source Pollution



2004 Water Quality Assessment for dissolved oxygen (D.O.) in South Puget Sound



# Lesson 2

## Nonpoint Source Pollution

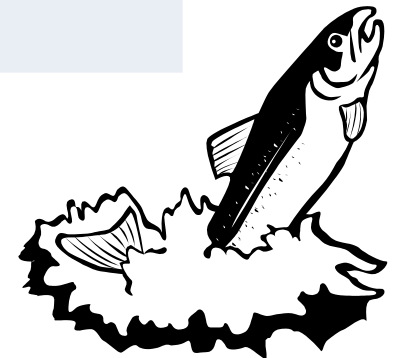


⌘ Why focus on dissolved oxygen (D.O.)?

☑ Aquatic species get oxygen from the water

☑ Low levels of D.O. can stress aquatic species

Dissolved Oxygen Level	Impact on Salmon
9 mg/L	Optimal
7-8 mg/L	Acceptable
3.5-6 mg/L	Poor
Below 3.5 mg/L	Stressful or fatal



# Lesson 2

## Nonpoint Source Pollution

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### How do nutrients contribute to low D.O.?

Plant growth is limited by nutrient availability. (That's why fertilizer makes plants grow.)

Excess nutrients (nitrogen & phosphorous) in water can cause excess growth of algae.

When the plants eventually die, the decomposition process uses up oxygen in the water.

The result is **hypoxia**, or oxygen depletion.



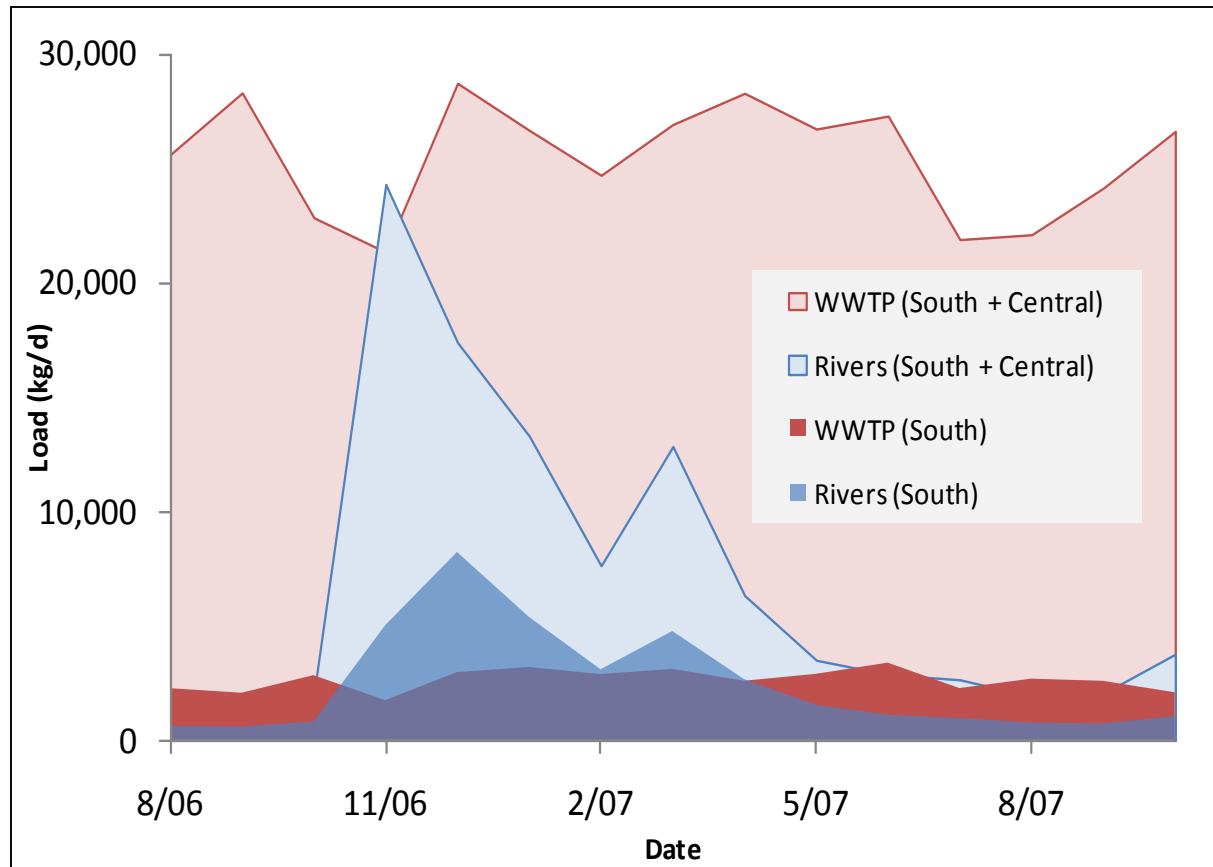


# Lesson 2

## Nonpoint Source Pollution



### What contributes to hypoxia?

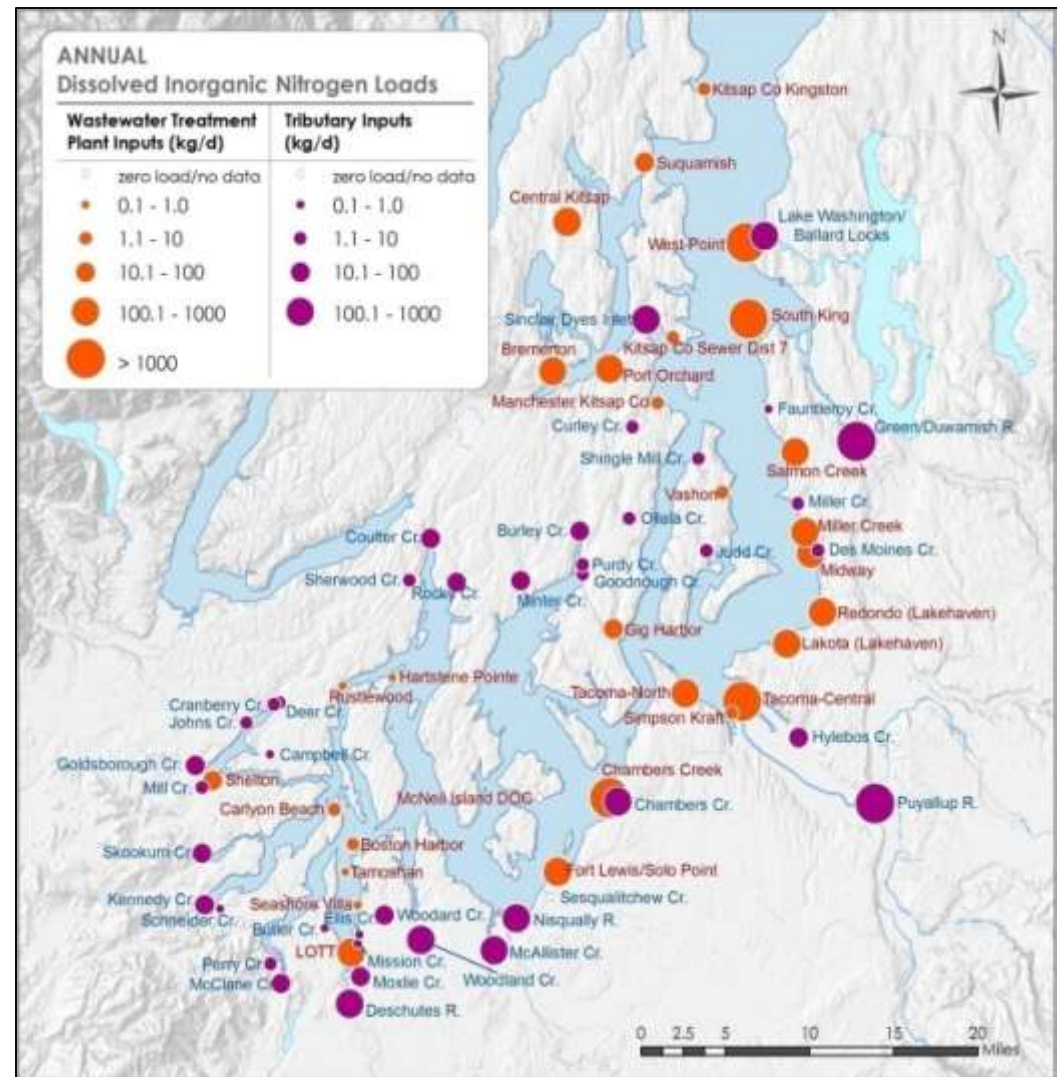


Both rivers and wastewater treatment plants (WWTPs) bring nutrients (in this case, *dissolved inorganic nitrogen*) into Puget Sound.

# Lesson 2

## Nonpoint Source Pollution

- ⌘ Which areas are most vulnerable to nitrogen inputs
- ⌘ How can you tell from the map?





# Lesson 2

## Nonpoint Source Pollution

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Do factors other than nutrient pollution lead to hypoxia?

⌘ Why is dissolved oxygen lower:

- ☐ in summer months?
- ☐ in stagnant water?
- ☐ at greater depths?

# Lesson 2

## Nonpoint Source Pollution

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What scientific questions would you ask to determine how to address hypoxia?

Questions being researched by the UW School of Oceanography's ORCA program:

- ⌘ Are human-derived nutrient inputs currently small relative to natural (physical and biological) fluxes?
- ⌘ Will increases in nutrient inputs (eutrophication) as population and industrialization increase adversely impact water quality in South Puget Sound?
- ⌘ What are the key factors in the cause of hypoxia in southern Hood Canal?



# Lesson 2

## Nonpoint Source Pollution

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How would you answer your scientific questions?



# Lesson 3

## Town Hall Meeting

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### **Objectives**

- ⌘ Take on perspectives of community stakeholders
- ⌘ Understand interconnected economic, social, and environmental factors related to keeping the Puget Sound healthy
- ⌘ Formulate realistic solutions for cleaning up or preventing Puget Sound pollution
- ⌘ Recognize that Puget Sound pollution prevention is a multi-faceted effort that involves consideration of multiple perspectives



# Lesson 3

## Town Hall Meeting

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Approximately how many cars, buses, and trucks are registered to owners in Puget Sound?

- A. 3.2 million
- B. 1.1 million
- C. 5.8 million
- D. 8.4 million

# Lesson 3

## Town Hall Meeting

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# Lesson 3

## Town Hall Meeting

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When drivers of cars, buses, and trucks hit their brakes, dust grinds off the brake pad and gets washed with stormwater into water. Copper from this dust can harm fish and aquatic life. How many pounds of copper wash into Puget Sound each year through stormwater?

- A. 32,000 pounds
- B. 70,000 pounds
- C. 12,000 pounds
- D. 5,000 pounds

# Lesson 3

## Town Hall Meeting

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# Lesson 3

## Town Hall Meeting

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How many lakes, streams, and rivers in Puget Sound are impacted by poor water quality?

- A. 245
- B. 805
- C. 594
- D. 715

# Lesson 3

## Town Hall Meeting

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# Lesson 3

## Town Hall Meeting

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**Scenario:** *According to the Washington Department of Ecology, there are millions of pounds of toxic pollution that enter Puget Sound every year. A number of aquatic species – including fish, birds, and barnacles – have become endangered because of this pollution. Government officials, large companies, tribal groups, concerned citizens, and non-governmental organizations have all been asked to attend a town hall meeting in order to determine what next steps to take in order to protect the endangered species and to prevent other species from becoming endangered. Your group has been asked to present a well-articulated, compelling plan to help decrease pollution in the Sound.*



# Lesson 3

## Town Hall Meeting

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### **Stakeholders**

Group 1: Association of Puget Sound Tribes

Group 2: Cruise Line Association

Group 3: Concerned Citizens for Puget Sound

Group 4: Northwest Regional Council

Group 5: Oil Refineries Representatives

Group 6: Office of Economic Development, Seattle

# Lesson 3

## Town Hall Meeting

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### Questions for each stakeholder group

- ⌘ What do you think should be done to improve the health of Puget Sound?
- ⌘ What stakeholders can support you in keeping the Sound healthy?
- ⌘ Aside from the general public, who will benefit from this plan?
- ⌘ What, if anything, are you willing to do to help with the management and conservation of the Sound?

# Lesson 4

## Video Production

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# What can we do?



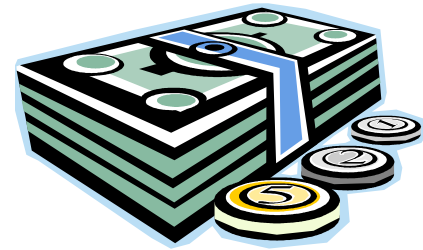
# Lesson 4

## Video Production

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**Student  
Action**



# Lesson 4

## Video Contest!

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- ⌘ Develop strategies to prevent pollution and improve water quality in Puget Sound
- ⌘ Create digital public service announcements that inform others of how they can be part of solutions
- ⌘ Submit these public service announcements to *Facing the Future* for a video contest

# Lesson 4

## Video Contest!

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## EPA Water Quality Video Contest



[http://www.epa.gov/owow\\_keep/videocontest.html](http://www.epa.gov/owow_keep/videocontest.html)



# Lesson 4

## Video Contest!

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## Bridges to Understanding



<http://www.bridgesweb.org>

# Lesson 4

## Video Contest!

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### Kinds of PSA formats

- ⌘ Video: Live action with dialog, voice over, and music
- ⌘ Digital Story: Still pictures and art with music and voice over
- ⌘ Hybrid: Mix Video and Digital Story

# Lesson 4

## Video Contest!

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Spread the word!

- ⌘ Contest open June thru November 2011
- ⌘ Open to formal and non-formal educators
- ⌘ Prizes: cash and Flip video cameras awarded to top 3 submissions
- ⌘ Educators with 10+ student submissions receive classroom set of FTF resources



# Make a Sound Impact

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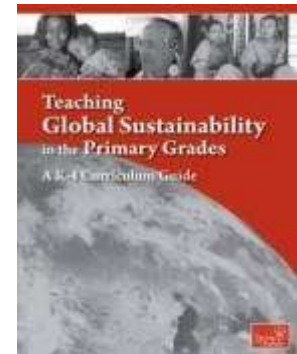
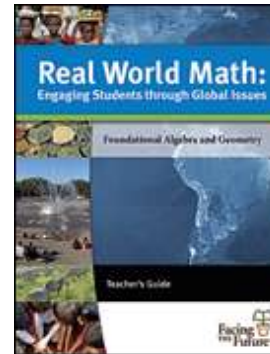
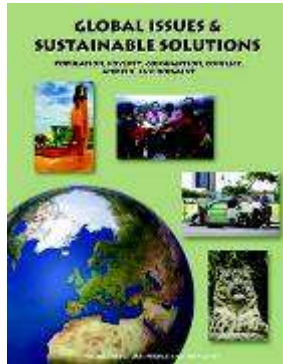
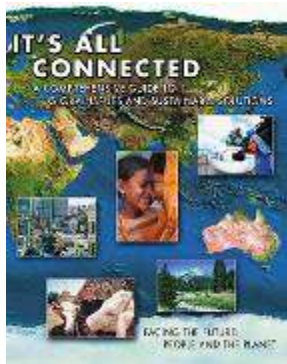
**Feedback / Questions?**

# Curriculum Resources



## Teacher's Guides

Over 30 free lessons available at [www.facingthefuture.org](http://www.facingthefuture.org)

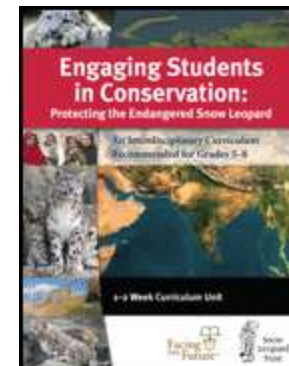
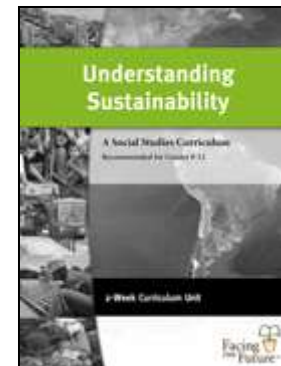


## Student Textbooks

Written for grades 6-12. Preview chapters available online

## Curriculum Units

1-2 weeks in length. Most free to download online



# Staying Connected

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⌘ Visit [www.facingthefuture.org](http://www.facingthefuture.org)

⌘ Sign up for FTF e-newsletter

⌘ Become a Peer Educator

⌘ Provide feedback via survey

⌘ Contact FTF:

[laura@facingthefuture.org](mailto:laura@facingthefuture.org)

[sheeba@facingthefuture.org](mailto:sheeba@facingthefuture.org)





*“We must teach our students that they can be architects of the future, rather than its victims.”*

~ Buckminster Fuller, architect and philosopher

